Role of calcium and vitamin D in the treatment of muscle pain: a case report

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Calcium and vitamin D deficiencies are associated with abnormal muscular functions including non-specific pain and weakness. A diet survey of a patient complaining of back pain showed a low calcium intake. Clinically patients may have low utilization of dietary calcium. In addition to the normal chiropractic treatments, the patient was given calcium and vitamin D supplements. These supplements greatly improved the recovery of the patient. The nutritional status of calcium and vitamin D in the general Canadian population is discussed.

KEY WORDS: chiropractic, calcium, vitamin D.

Les déficiences en calcium et en vitamine D sont associées avec des fonctions musculaires anormales, y compris faiblesse et douleur non-spécifique. L'examen de la diète d'un client qui se plaignait de douleur au dos a démontré une ration faible en calcium. Cliniquement, les patients peuvent démontrer une faible réponse au calcium diététique. En plus des traitements chiropratiques normaux, on a donné au patient des suppléments en vitamine D et en calcium. Ces suppléments ont grandement profité au rétablissement du patient. On discute du statut nutritif du calcium et de la vitamine D dans la population canadienne en général.

MOTS CLÉS: chiropratique, calcium, vitamine D

Introduction

Calcium is present in the body in larger amounts than any other mineral element. About 99% of the body calcium is in the skeleton. The very small quantity of calcium not present in skeletal structure is in the body fluids, where it is in part ionized. This small amount of ionized calcium in the body fluids is of great importance in blood and muscles. It is also required for the synthesis of acetylcholine, a substance necessary for transmission of nerve impulse.[1,2]

The Recommended Daily Allowance of calcium for an adult is 0.8 grams per day. The RDA for calcium is based on endogenous losses and true absorption of calcium. Dietary calcium absorption requires a sufficient supply of vitamin D, whether from the diet or from exposure to ultra-violet radiation. Deficiency of either calcium or vitamin D causes rickets in children and osteomalacia in adults. Berlynne describes osteomalacia in a Bedouin woman who had a calcium intake of less than 500 mg daily, but an apparently adequate source of vitamin D.[3]

The presence of oxalic acid or phytic acid in foods results in the formation of insoluble calcium complexes with calcium absorption. Oxalic acid is present in rhubarb, spinach, chard and beet greens. Phytic acid exists mainly in the outer husk of cereal grain and is abundant in whole meal flour. The increased usage of natural foods and whole meal flour may result in sufficient increases of phytic acid.[4]

Milk and dairy products are the outstanding source of calcium in the diet. In normal diets, the above provide about 60% of dietary calcium. Without them, a satisfactory intake of calcium is extremely difficult. Other sources of calcium include meat, poultry, fish, egg, bread, cereals, fruits and vegetables. Deficiency of calcium or vitamin D intake causes rickets or osteomalacia, as stated above. However, there are populations which do not consume milk or dairy products, always being at the sub-deficiency level, and although rickets and osteomalacia were not observed in these populations, non-specific spasm and pain are the prominent symptoms.

Case report

Mr. J.R., age 28, presented to this clinic on May 8, 1984, complaining of back pain. The patient is a letter carrier. He stated that carrying a heavy mail bag aggravates the pain. When he ceased to carry the bag, the pain would ease. The pain radiates to his right shoulder. The pain started several weeks ago and is getting progressively worse.

On physical examination of his back, the following were noted:

1. Hypertonicity of the paraspinal muscles at the right side of T3, T4 and T5 and left side of L3, L4, and L5. These muscles produce pain on palpation.
2. Compression of the spine produced pain at T4, T5 and L3.
3. Hypomobility was found at the following joints: T3-T4, T4-T5, L3-L4, L4-L5 and left sacro-iliac joint. Deep tendon reflexes of upper and lower extremities were unremarkable.

The patient was treated from May 8, 1984 to August 14, 1984 averaging two to three visits per week. He felt better immediately after each treatment but afterward the pain returned. At this point, a nutrition survey of the patient was carried out. The typical diets of the patient are shown below.

Day 1

	Food	Amount
Breakfast	Oats, raisins with honey	2 cups
	Rye Bread	2 slices
	Muffin	one
	Butter	1 tsp.

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Lunch	Tuna Fish Sandwich	
	(Tuna)	2 oz.
	(Whole Wheat Bread)	3 slices
	Potato Salad	3 oz.
Dinner	Brown Rice	2 cups
	Chicken	6 oz.
	Green Beans & Broccoli	4 oz.
Others	Herbal Tea	1 cup
	Muffin	one
	Apple Juice	3 cups
	Grape Juice	4 cups

Day 2

	Food	Amount
Breakfast	Banana	one
	Oats with Raisins and Honey	2 cups
	Rye Bread	3 slices
Lunch	Tuna Fish on	3 oz.
	whole wheat bread	2 slices
	Tomato soup	2 cups
Dinner	Potato	4 (med.)
	Fish	6 oz.
	Broccoli	4 oz.
	Spinach Salad	5 oz.
	Grapes	12
Others	Banana	1
	Herbal Tea	3 cups

The calcium intake of the above diet was calculated at 655 mg per day.[5] The majority of the patient's calcium intake originates from the bread group which also is high in oxalate and phytate. Those two substances bind calcium and lower its digestability[6]. Another aspect with regard to the patient's diet is that the patient does not consume any milk and dairy products which are the best source of calcium in the Canadian diet.

From the observations of the diet survey, it was concluded that the patient is low in calcium intake as well as its utilization by the body. The patient was then advised to take calcium supplementation at 660 mg per day and halibut liver oil as a source of vitamin D., at 400 I.U. per day. The muscle pain subsided considerably 3 days after the intake of the supplements and the patient was pain free after two weeks. Physical examination showed that the hypertonicity of the muscles almost disappeared and were pain free on palpation. Although the hypomobility of the spinal joints still existed, these were not worse than in average healthy individuals. The patient was advised to drink two cups of milk per day to ensure an adequate calcium intake and to take halibut liver oil for several more weeks.

Summary

There are a number of unrecognized cases of non-specific muscle pain and weakness which are associated with low calcium or vitamin D intakes. Muscle pain and weakness in many unrelated bone disorders has been reported to be related to low vitamin D in the body.[7]

As stated before, milk is the best source of calcium. It requires about 11 eggs or 15 or more servings of fruits and vegetables to provide the same amount of calcium as one cup of milk. Calcium digestion and absorption from the milk is unaltered when the milk is sterilized, homogenized or skimmed. Vitamin D plays an important role in calcium absorption. In Canada, adults with light skin do not need vitamin D from the diet if they are exposed to adequate sunlight. In general, natural foods contain sufficient vitamin D precursors which are stored under the skin. These substances are converted to vitamin D by ultra-violet irradiation. However, dust, smoke, clothing or window glass all act as barriers to prevent the rays from reaching the skin. In order to ensure adequate vitamin D intake, a daily supplement of 100 I.U. is recommended for a normal adult. The allowances for growing children, adolescents, pregnant and lactating women are recommended as 400 I.U. per day.

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